PATENT ABSTRACTS OF JAPAN

10/507413

(11)Publication number : 08-090534
(43)Date of publication of application : 09.04.1996

)Int.CI. B28B 3/26
// B29C 47/12

)Application number : 06-235250
:)Date of filing : 29.09.1994

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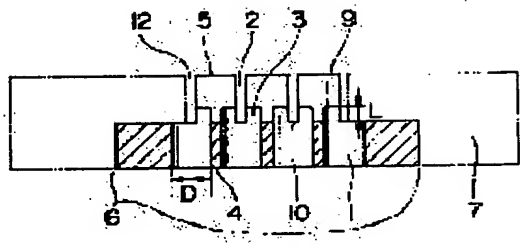
;) BASE FOR MOLDING HONEYCOMB

')Abstract:
RPOSE: To mold a channel structure for obtaining a homogeneous
lded form having less distortion.
)NSTITUTION: A base for molding a honeycomb comprises a plurality of
naust channels 2 made of latticelike grooves, and a plurality of feed
annels 1 connected to the channels 2 to split supply paste, wherein the
ste supplied from an upstream end 4 is molded in a continued latticelike
lded form and exhausted from a downstream end 5. The channels 1 are
:ended to the upstream ends of the channels 2, and reservoirs 3 having a
annel sectional area larger than the channels 1 are provided at the upper
eam ends. Accordingly, excellent mechanical processability and
nensional accuracy can be provided.



GAL STATUS

ate of request for examination] 27.09.2001
ate of sending the examiner's decision of rejection] 06.07.2004
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AIMS

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aim(s)]
aim 1] In a mouthpiece the object for honeycomb shaping which is equipped with two or more outflow ways which sist of a grid-like slot, and two or more feeding passage which is connected to each outflow way and carries out ision supply of the paste, and fabricates this paste in the shape of [continuous] a grid -- the object for honeycomb ping characterized by having made the upper edge of each outflow way extend each feeding passage, and ıblishing the reservoir which has the larger passage cross section than each feeding passage in each upper edge -- a uthpiece.
aim 2] the object for honeycomb shaping according to claim 1 -- the object for honeycomb shaping to which each ding passage is extended by die-length L at the upper edge of each outflow way in a mouthpiece while it is formed in shape of [which has a diameter D] a hollow cylinder, and, as for a reservoir, the ratio of said die-length L and said meter D is characterized by being formed by 0.1<ratio-of-length-to-diameter<1 -- a mouthpiece.

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TAILED DESCRIPTION

etailed Description of the Invention]
01]
dustrial Application] the suitable object for honeycomb shaping for this invention to relate to the mouthpiece which ries out extrusion molding of the ceramics or the catalyst to the shape of a honeycomb, excel in dimensional uracy, and prevent a check -- it is related with a mouthpiece.
02]
escription of the Prior Art] the conventional object for honeycomb shaping -- a mouthpiece -- setting -- the paste of a material -- the object for honeycomb shaping -- honeycomb shaping of the ceramics or a catalyst is performed by ruding from a mouthpiece (mouthpiece). As shown in drawing 8 - drawing 11 , a common mouthpiece consists of or more passage, and is divided into the two-layer passage of the flow direction of a paste. Two-layer passage nects the paste which was prepared in the upstream of a mouthpiece 6 and was supplied from the extruder which is illustrated to the down-stream end face 10 of two or more feeding passage 1 which carries out division feeding, and feeding passage 1 in each passage, is established in the downstream of a mouthpiece 6, and is formed of two or more flow ways 2 which fabricate the paste sent in from the feeding passage 1 in the shape of a grid (the shape of a neycomb). At the time of extrusion molding, in order to form the outermost periphery rib 12 of a honeycomb, an er frame 7 is fitted in and used for a mouthpiece 6.
03] Subsequently, the unit passage of a mouthpiece is shown in drawing 12 , and the function of each part is plained. As for a mouthpiece, two or more these unit passage is connected with juxtaposition. At the time of extrusion lding, once the paste supplied to the upper edge 4 of a mouthpiece 6 is divided, flows in each feeding passage 1, and sses the inside of the hollow cylinder. The paste which passed through the feeding passage 1 flows into the outflow y 2 which makes the slot of the cruciform section combined with the down-stream end face 10 of the feeding passage Since the passage cross section S0 of the feeding passage 1 and passage cross-section S+ of the outflow way 2 have relation of S0>S+ in the boundary section of the feeding passage 1 and the outflow way 2, the paste which flowed o the cross-joint slit spreads toward the lateral passage sticking-by-pressure side 8 to a passage shaft. For this reason, aste is mutually stuck by pressure in respect of [8] unification sticking by pressure of a cross-joint Plastic solid, ile passing a cross-joint slit, and at the down-stream edge of a mouthpiece 6, a honeycomb cel is fabricated ntinuously.
04] In order to promote sticking by pressure in the passage sticking-by-pressure side 8 of a mouthpiece 6, as shown drawing 13 , there are some which were made to carry out crossover duplication with the outflow way 2 by the ngitudinal direction of the feeder current way 1, turned to the downstream, tapered off and set this duplication section structure 11a. This mouthpiece 6 is supposed that the grid-like honeycomb which a paste becomes easy to flow in a ngitudinal direction, the outlet, i.e., the duplication section, of the feeder current way 1, and does not have a defect is tained. Moreover, when machining a mouthpiece 6, it is common that carry out hole dawn processing of the feeding ssage 1 with a drill from the upper edge 4 of a mouthpiece 6, and a grinding stone performs slot end processing of the tflow way 2 in the shape of a grid first from the location which the feeding passage 1 subsequently processed from the posite side extends. Since the mouthpiece processed by this approach is unsuitable, the point angle, i.e., the tapering ucture, of a drill, even if it is easy to produce weld flash in the contact and intersection of the hole of feeding passage, d the slot of an outflow way and carries out trimming, the difference of delicate surface roughness may be generated each passage.
05]
roblem(s) to be Solved by the Invention] the conventional object for honeycomb shaping -- the mouthpiece with nich both machinability at the time of manufacturing a mouthpiece and honeycomb moldability of a mouthpiece were

ıbled although the paste could be fabricated in the shape of a honeycomb if it w[illegible]n the mouthpiece -- the ısideration as proper structure is not made. That is, since the reservoir is not enough, poor sticking by pressure and rate-of-flow difference between each passage occur in the location which a paste moves to an outflow way from a der current way, and the problem which paste back pressure reduces is in it. Moreover, in order to carry out hole vn processing of the feeding passage with a drill from an upper edge when machining a mouthpiece, and for a nding stone to, perform slot end processing of an outflow way from an opposite side subsequently to the shape of a d, even if it carries out trimming, the difference of surface roughness occurs in each passage, a flow resistance ference is produced in each passage, and there are a piece at the time of the deflection of a Plastic solid or shaping l a problem which leads to the crack at the time of desiccation if it lengthens.

)06] the object for honeycomb shaping which the purpose of this invention has the passage structure where a nogeneous Plastic solid with few strains can be acquired, and was excellent in machinability -- it is in offering a uthpiece.

)07]

eans for Solving the Problem] the object for honeycomb shaping which starts this invention in order to attain the rementioned purpose -- a mouthpiece In a mouthpiece the object for honeycomb shaping which is equipped with two more outflow ways which consist of a grid-like slot, and two or more feeding passage which is connected to each flow way and carries out division supply of the paste, and fabricates a paste in the shape of [continuous] a grid -- e upper edge of each outflow way is made to extend each feeding passage, and it considers as the configuration which ablished the reservoir which has the larger passage cross section than each feeding passage in each upper edge.

)08] And each feeding passage may be extended by die-length L at the upper edge of each outflow way while it is med in the shape of [which has a diameter D] a hollow cylinder, and the configuration that the ratio of die-length L l a diameter D is formed by 0.1<ratio-of-length-to-diameter<1 is sufficient as a reservoir.

)09]

ınction] According to this invention, the paste by which division supply was carried out in feeding passage flows in outflow way which makes grids structure via the reservoir which extended feeding passage and was formed in the per edge of an outflow way. the section (die length) of the direction of extrusion predetermined more greatly [this ervoir / the passage cross section] than feeding passage and -- it is -- etc. -- since it is prepared as cross-section ssage, the role of a reservoir of the paste distributed to an outflow way is played, and the function to send out a paste a longitudinal direction and the outflow way of the downstream by the almost equal pressure is given. consequently, difference in the pressure drawdown between each feeding passage eases -- having -- a mouthpiece -- the velocity tribution of an outlet also tends to become uniform, and the residual stress in a Plastic solid is also reduced, and it ds to preventing the strain and crack at the time of desiccation baking.

)10] moreover, the thing for which a feeder current way inside is smoothed by reaming where generating of return by ıchining was prevented by the connection of a feeder current way and an outflow way and generating of return is pressed by extending feeding passage and establishing a reservoir in the upper step of an outflow way -- a uthpiece -- equalization of the velocity distribution of an outlet is attained. Also when it tapers off to the downstream the feeder current way which furthermore carried out crossover duplication with the outflow way and a taper is med, the same effectiveness is acquired fundamentally. further -- the ratio of die-length L of a reservoir, and the ımeter D of a feeder current way -- 0.1 -- < -- ratio of length to diameter Since it is formed by <1, it is hard to produce haping strain and causing breakage and deformation of a mouthpiece is lost.

)11]

xample] One example of this invention is explained referring to drawing 1 - drawing 3 . Two or more outflow ways 2 ıich consist of a grid-like slot as shown in drawing 1 - drawing 3 , It has two or more feeding passage 1 which is nnected to each outflow way 2 and carries out division supply of the paste. It is a mouthpiece. the object for neycomb shaping which fabricates the paste supplied from the upper edge 4 in the shape of [continuous] a grid, and scharges a Plastic solid from the down-stream edge 5 -- The upper edge of each outflow way 2 is made to extend each eding passage 1, and it considers as the configuration which established the reservoir 3 which has the larger passage oss section than each feeding passage 1 in each upper edge. And each feeding passage 1 is extended by die-length L at upper edge of each outflow way 2 while it is formed in the shape of [which has a diameter D] a hollow cylinder. ıat is, the down-stream end face 9 of each feeding passage 1 shall be extended from the upper end face 10 of each tflow way 2 by the downstream by die-length L between the down-stream end face 9 and the upper end face 10, and reservoir 3 shall be formed so that the ratio of die-length L and a diameter D may be set to 0.1<ratio-of-length-to-ımeter<1. In addition, at the time of extrusion molding, in order to form the outermost periphery rib 12 of a neycomb, it is used for a mouthpiece (for honeycomb shaping mouthpiece) 6 by the outer frame 7, fitting into it.

12] Actuation of this example is explained using drawing 1 - drawing 4 . It flows in the outflow way 2 which sists of a grid-like slot via the reservoir 3 which the paste by which division supply was carried out extended the low cylinder-like feeding passage 1 to the downstream, and was formed in the feeding passage 1. Since the passage ss section is greatly prepared in the direction of extrusion of a paste as cross-sections [section / (die length) / determined] passage rather than the feeding passage 1 as A line of drawing 4 shows this reservoir 3, the function to d out a paste to a longitudinal direction and the outflow way of the downstream by the almost equal pressure is en. consequently, the difference in the pressure drawdown between each feeding passage eases -- having -- a uthpiece -- the velocity distribution of the paste in an outlet also tends to become uniform, and the residual stress in a stic solid can also be reduced, and it leads also to preventing the strain and crack at the time of desiccation baking. In ition, the example of the others mentioned later which shows B line of drawing 4 to drawing 5 - drawing 7 , the ventional example which shows C line to drawing 8 - drawing 10 , and the D line express change of each passage ss section to the passage location of the conventional example shown in drawing 13 .

13] According to this example, machinability also serves as dominance extremely. That is, generating of return of chining in the intersection of a feeder current way and an outflow way can be prevented by extending feeding sage and establishing a reservoir in the upper edge of an outflow way. moreover, the condition of having suppressed erating of return in this example although the level difference arose between the apical surface of the hole of a feeder rent way, and the slot of an outflow way and generating of return was made promoting by the connection of a feeder rent way and an outflow way with the conventional structure when it was going to ream the feeder current way -- a der current way inside -- reaming -- smooth -- it can carry out -- a mouthpiece -- equalization of the velocity tribution in an outlet can be attained.

14] there is the same effectiveness as the example which also shows the configuration which tapered off at the tip of downstream of the feeder current way 1 extended at the upper edge of the outflow way 2, and formed the taper 11 damentally to drawing 1 - drawing 4 so that drawing 5 - drawing 6 may be boiled and shown as other examples of ; invention. That is, since the tapering taper 11 can be appropriately chosen according to the point angle of a drill, erating of return is prevented.

15] The point of this example is to establish a bigger reservoir than the passage cross section of feeding passage in upper edge of an outflow way, it is not generated by the die length of arbitration and the effectiveness of die-length f a reservoir 3 demonstrates the greatest effectiveness in a certain range. That is, die-length L cannot discover the alization effectiveness of short ** past ** and a paste, either, but the shear rate by deformation of a paste becomes ge in a narrow field, and it is easy to leave a shaping strain. It stops moreover, also discovering the effectiveness of return prevention at the time of machining. On the contrary, the reinforcement of the pin-like projection with which -length L is formed between outflow ways may fall, and a mouthpiece long beyond the need may cause breakage and ormation of a mouthpiece. The suitable die-length L dimension in consideration of these things is expressed with (1) e.

16]

-- < -- ratio of length to diameter <1 .... (1)

re, it is the diameter of feeding passage. : The die length of D reservoir : In order to check the effectiveness of L ample) this example, the mouthpiece of the following dimension configuration was made as an experiment with the acture shown in drawing 5 - drawing 7 .

17]

pitch : 3.3mm rib thickness : The die length of the diameter [of D:2.6mm] phi feeding passage of 0.4mm feeding sage : 14.5mm outflow way : 5.0mm -- a mouthpiece -- thickness : Die-length [of 19.0mm reservoir] L : knumber of 0.5mm cels 47 cels (appearance 155.7mmx155.7mm)

feeder current way is with a drill and a parallel reamer, and the outflow way was processed with BN (boron nitride) nding stone. The inside granularity of the obtained passage is as follows.

18] Hole of feeding passage : Slot of 3-micrometer or less outflow way : 0.2 micrometers, using this mouthpiece and ew extruder, Ti02 system powder / glass fiber / methyl cellulose / water was kneaded with the kneader, and was ricated with a denitrification catalyst paste. Consequently, the Plastic solid also with good sticking by pressure ween cels which does not have deflection at the compacting pressure of P= 45-50kg/cm2, the rate of flow V= 200 - 0 mm/min was acquired. Moreover, this Plastic solid was able to be dried under 85 degree-Cx70% conditions, and the althy desiccation object without a crack was able to obtain.

19] (Example of a comparison) In order to compare with an example, the mouthpiece of the following dimension nfiguration was made as an experiment with the structure shown in drawing 8 as an example of a comparison.

20]

pitch : 3.3mm rib thickness : The die length of the diameter [of D:2.6mm] phi feeder current way of 0.4mm feeding sage : 14.0mm outflow way : 5.0mm -- a mouthpiece -- thickness : The die length of 19.0mm reservoir : 47xnumber)mm cels 47 cels (appearance 155.7mmx155.7mm)

for the outflow way, the feeder current way processed only drill (it exchanges for every 200 hole processing) cessing with BN grinding stone. The inside granularity of the obtained passage is as follows.

)21]

le of a feeder current way : Slot of 8-20-micrometer outflow way : 0.2 micrometers of Ti02 system denitrification alyst pastes of the same presentation as an example and the same lot were fabricated using this mouthpiece and screw ruder. Consequently, compared with an example, a pressure is high and the rate of flow is slow at the compacting ssure of P= 50-55kg/cm2, the rate of flow V= 150 - 200 mm/min. Moreover, the Plastic solid bent to the one ection, and when this deflection rotated the mouthpiece, it has been concluded that it was a thing resulting from the ıfiguration of a mouthpiece from the place which the direction of deflection also changes according to it. Moreover, a result of drying this Plastic solid under 85 degree-Cx70% conditions, when deflection was restrained, the ısversal crack entered with the part as the starting point which the strain of tension produced.

)22] It is considered to be the causes that these phenomena have the coarse front face of a feeder current way and that eservoir does not exist in the upper edge of the feeding passage of a paste.

)23]

fect of the Invention] According to this invention, since the reservoir of a paste was established in the upper edge of ding passage, since machinability is excellent, dimensional accuracy improves, and shaping processing speed comes large with low voltage, and there is effectiveness which can fabricate a homogeneous Plastic solid with few ıins.

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AWINGS

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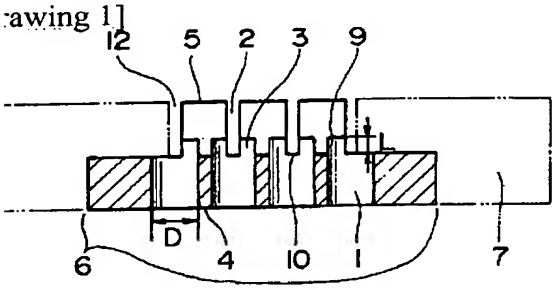

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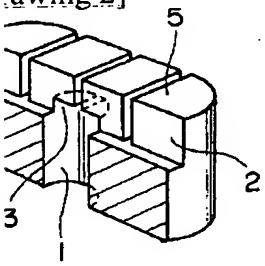

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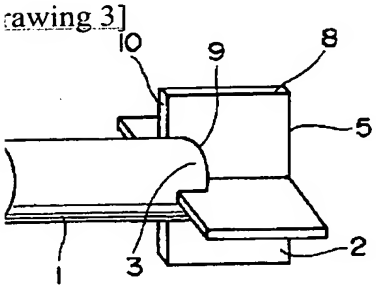

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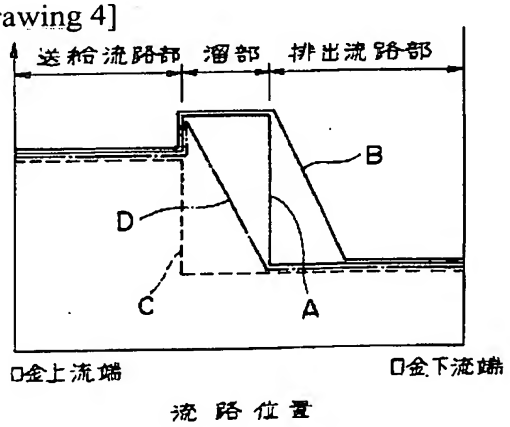

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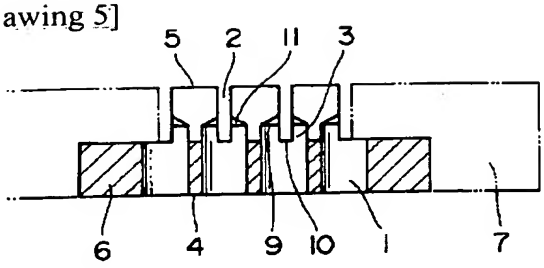

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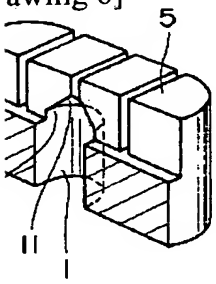

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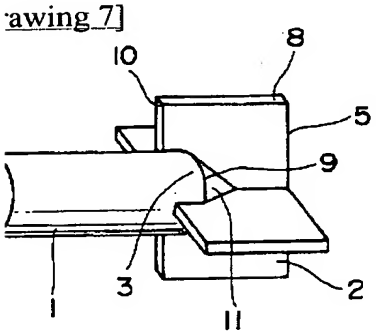

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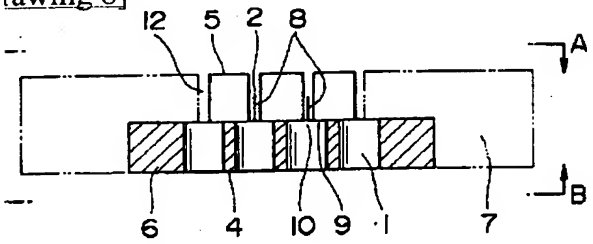

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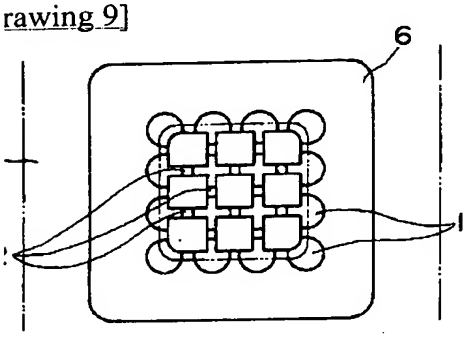

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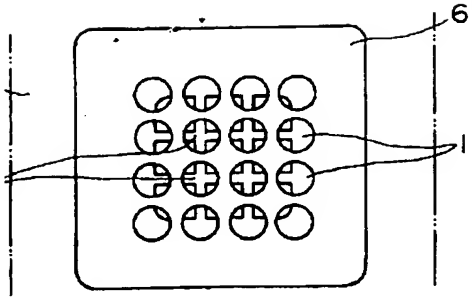

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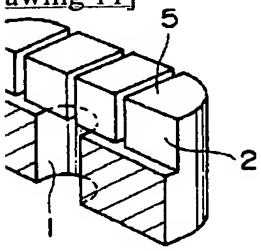

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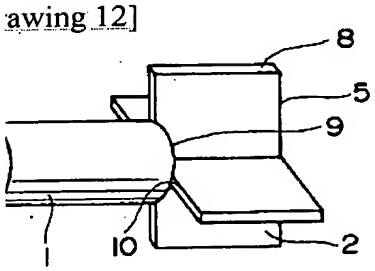

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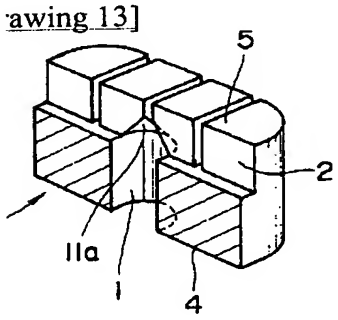

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(19)日本国特許庁（ＪＰ）　(12)公開特許公報（A）　(11)特許出願公開番号

特開平8－90534

(43)公開日　平成８年(1996)４月９日

(51)Int.Cl.[6]	識別記号	庁内整理番号	ＦＩ	技術表示箇所
Ｂ２８Ｂ　3/26	Ａ			
// Ｂ２９Ｃ　47/12		9349－4Ｆ		

審査請求　未請求　請求項の数２　ＯＬ　（全 ６ 頁）

(21)出願番号　特願平6－235250

(22)出願日　平成６年(1994)９月29日

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最終頁に続く

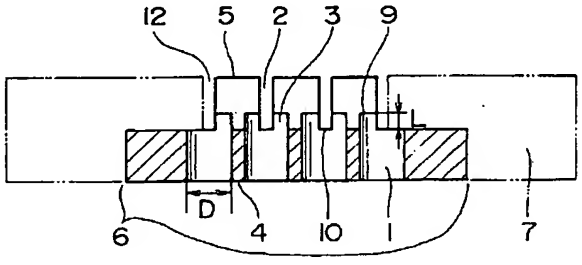
(54)【発明の名称】　ハニカム成形用口金

(57)【要約】

【目的】　ひずみの少ない均質な成形体を得る流路構造を形成可能とする。

【構成】　格子状の溝よりなる複数の排出流路２と、それぞれの排出流路２に接続してペーストを分割供給する複数の送給流路１とを備え、上流端４より供給されたペーストを連続した格子状に成形体に成形し下流端５より排出するハニカム成形用口金であって、それぞれの送給流路１をそれぞれの排出流路２の上流端部に延長させ、それぞれの上流端部にそれぞれの送給流路１より大きい流路断面積を有する溜部３を設けた。

【効果】　機械加工性と寸法精度とに優れる。



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【特許請求の範囲】

【請求項１】　格子状の溝よりなる複数の排出流路と、それぞれの排出流路に接続されペーストを分割供給する複数の送給流路とを備え、該ペーストを連続した格子状に成形するハニカム成形用口金において、それぞれの送給流路をそれぞれの排出流路の上流端部に延長させ、それぞれの上流端部にそれぞれの送給流路より大きい流路断面積を有する溜部を設けたことを特徴とするハニカム成形用口金。

【請求項２】　請求項１記載のハニカム成形用口金において、それぞれの送給流路は、直径Ｄを有する中空円柱状に形成されるとともにそれぞれの排出流路の上流端部に長さＬで延長され、溜部は、前記長さＬと前記直径Ｄとの比が０．１＜Ｌ／Ｄ＜１で形成されていることを特徴とするハニカム成形用口金。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、セラミックスや触媒をハニカム状に押出し成形する口金に係り、特に寸法精度に優れかつ乾燥割れを防止するのに好適なハニカム成形用口金に関する。

【０００２】

【従来の技術】従来のハニカム成形用口金においては、原料のペーストをハニカム成形用口金（口金）より押出すことにより、セラミックスや触媒のハニカム成形を行っている。一般的な口金は、図８～図１１に示すように、複数の流路よりなり、ペーストの流れ方向の２層の流路に分けられる。２層の流路は、口金６の上流側に設けられ、図示しない押出機より供給されたペーストを個々の流路に分割送給する複数の送給流路１と、送給流路１の下流端面１０に接続して口金６の下流側に設けられ、送給流路１より送り込まれたペーストを格子状（ハニカム状）に成形する複数の排出流路２とにより形成される。押出成形時には、ハニカムの最外周リブ１２を形成するため、口金６に外枠７を嵌合して使用する。

【０００３】次いで図１２に口金の単位流路を示し、各部の機能を説明する。口金はこの単位流路が複数個並列に連結されたものである。押出成形時には、口金６の上流端４に供給されたペーストは、一旦、分割され個々の送給流路１内に流入してその中空円柱の内面を通過する。送給流路１を通過したペーストは、送給流路１の下流端面１０に結合されている十字断面の溝をなす排出流路２へ流入する。送給流路１と排出流路２との境界部において送給流路１の流路断面積Ｓ０と排出流路２の流路断面積Ｓ＋とは、Ｓ０＞Ｓ＋の関係にあるため、十字スリットに流入したペーストは、流路軸に対して横方向の流路圧着面８に向かって広がる。このため、ペーストは、十字スリットを通過する間に十字成形体の合流圧着面８で互いに圧着し、口金６の下流端ではハニカムセルが連続して成形される。

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【０００４】口金６の流路圧着面８における圧着を促進させるため、図１３に示すように、供給流路１の長手方向で排出流路２と交差重複させ、この重複部を下流側に向けて先細り構造１１ａにしたものがある。この口金６は、供給流路１の出口すなわち重複部でペーストが横方向に流れ易くなり、欠陥のない格子状ハニカムが得られるとされている。また、口金６を機械加工する場合、まず口金６の上流端４よりドリルによって送給流路１を穴明け加工し、次いで反対面より、加工した送給流路１の延長する位置より砥石によって格子状に排出流路２の溝切り加工を行うのが一般的である。この方法で加工した口金は、ドリルの先端角つまり先細り構造が不適当なため、送給流路の穴と排出流路の溝との接点や交差部でバリが生じ易く、バリ取りをしても各流路に微妙な表面粗さの差を発生することがある。

【０００５】

【発明が解決しようとする課題】従来のハニカム成形用口金にあっては、ペーストをハニカム状に成形することはできるが、口金を製作する際の機械加工性及び口金のハニカム成形性の両者を合わせた口金適正構造としての配慮がなされていない。すなわち、ペーストが供給流路より排出流路に移動する位置に溜部が十分でないため、圧着不良や各流路間の流速差が発生し、ペースト背圧が低減する問題がある。また、口金を機械加工する場合、上流端よりドリルにより送給流路を穴明け加工し、次いで反対面より砥石によって格子状に排出流路の溝切り加工を行うため、バリ取りをしても各流路に表面粗さの差が発生し、個々の流路で流動抵抗差を生じ、成形体の曲がりや成形時の切れ、引いては乾燥時の割れにつながる問題がある。

【０００６】本発明の目的は、ひずみの少ない均質な成形体を得ることのできる流路構造を有し、かつ機械加工性に優れたハニカム成形用口金を提供することにある。

【０００７】

【課題を解決するための手段】前記の目的を達成するため、本発明に係るハニカム成形用口金は、格子状の溝よりなる複数の排出流路と、それぞれの排出流路に接続されペーストを分割供給する複数の送給流路とを備え、ペーストを連続した格子状に成形するハニカム成形用口金において、それぞれの送給流路をそれぞれの排出流路の上流端部に延長させ、それぞれの上流端部にそれぞれの送給流路より大きい流路断面積を有する溜部を設けた構成とする。

【０００８】そしてそれぞれの送給流路は、直径Ｄを有する中空円柱状に形成されるとともにそれぞれの排出流路の上流端部に長さＬで延長され、溜部は、長さＬと直径Ｄとの比が０．１＜Ｌ／Ｄ＜１で形成されている構成でもよい。

【０００９】

【作用】本発明によれば、送給流路に分割供給されたペ

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ーストは、送給流路を延長して排出流路の上流端部に形成された溜部を経由し、格子構造をなす排出流路内に流入する。この溜部は、送給流路よりも流路断面積が大きく、かつ押出方向の所定の区間（長さ）で等断面積流路として設けられているため、排出流路に分配されるペーストの溜めの役割を果たし、ペーストを横方向と下流側の排出流路とにほぼ均等な圧力で送り出す機能が付与される。その結果、個々の送給流路間における圧力降下の差異が緩和され、口金出口の流速分布も均一となり易く、また成形体中の残留応力も低減され、乾燥焼成時におけるひずみや割れを防ぐことにつながる。

【００１０】また送給流路を延長して排出流路の上流段部に溜部を設けることにより、供給流路と排出流路との接続部で機械加工による返りの発生が防止され、返りの発生を抑えた状態で供給流路内面をリーマ加工により滑らかにすることにより、口金出口の流速分布の均一化が図られる。さらに排出流路と交差重複した供給流路の下流側に先細りテーパを設けた場合も基本的に同様の効果が得られる。さらに溜部の長さＬと供給流路の直径Ｄとの比が０．１＜　Ｌ／Ｄ　＜１で形成されているため、成形ひずみが生じ難く、口金の破損や変形を引き起こすことがなくなる。

【００１１】

【実施例】本発明の一実施例を図１～図３を参照しながら説明する。図１～図３に示すように、格子状の溝よりなる複数の排出流路２と、それぞれの排出流路２に接続されてペーストを分割供給する複数の送給流路１とを備え、上流端４より供給されたペーストを連続した格子状に成形し成形体を下流端５より排出するハニカム成形用口金であって、それぞれの送給流路１をそれぞれの排出流路２の上流端部に延長させ、それぞれの上流端部にそれぞれの送給流路１より大きい流路断面積を有する溜部３を設けた構成とする。そして、それぞれの送給流路１は、直径Ｄを有する中空円柱状に形成されるとともにそれぞれの排出流路２の上流端部に長さＬで延長され、つまりそれぞれの送給流路１の下流端面９がそれぞれの排出流路２の上流端面１０より下流側に、下流端面９と上流端面１０との間の長さＬで延長され、溜部３は、長さＬと直径Ｄとの比が０．１＜Ｌ／Ｄ＜１になるように形成されているものとする。なお押出成形時は、ハニカムの最外周リブ１２を形成するため、口金（ハニカム成形用口金）６に外枠７が嵌合して使用される。

【００１２】本実施例の動作を図１～図４を用いて説明する。送給流路１に分割供給されたペーストは、中空円柱状の送給流路１を下流側に延長して形成した溜部３を経由し格子状の溝よりなる排出流路２内に流入する。この溜部３は、図４のＡ線で示すように、送給流路１よりも流路断面積が大きく、かつペーストの押出方向に所定の区間（長さ）を等断面積流路として設けられているため、ペーストを横方向と下流側の排出流路にほぼ均等な

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圧力で送り出す機能が付与される。その結果、個々の送給流路間における圧力降下の差異が緩和され、口金出口におけるペーストの流速分布も均一となり易く、また成形体中の残留応力も低減でき、乾燥焼成時のひずみや割れを防ぐことにもつながる。なお図４のＢ線は図５～図７に示す後述する他の実施例、Ｃ線は図８～図１０に示す従来例、またＤ線は図１３に示す従来例の流路位置に対する各流路断面積の変化を表している。

【００１３】本実施例によれば、機械加工性も極めて優位となる。すなわち、送給流路を延長して排出流路の上流端部に溜部を設けることにより、供給流路と排出流路との交差部における機械加工の返りの発生が防止できる。また従来の構造では供給流路をリーマ仕上げしようとすると、供給流路の穴の先端面と排出流路の溝との間に段差が生じ、供給流路と排出流路との接続部で返りの発生を助長させていたが、本実施例では、返りの発生を抑えた状態で供給流路内面をリーマ加工により滑らかにすることができ、口金出口での流速分布の均一化を図ることができる。

【００１４】本発明の他の実施例として図５～図６をに示すように、排出流路２の上流端部に延長した供給流路１の下流側の先端に先細りテーパ１１を設けた構成も基本的に図１～図４に示す実施例と同様の効果がある。すなわち先細りテーパ１１をドリルの先端角に応じて適切に選択できるため、返りの発生が防止される。

【００１５】本実施例のポイントは、排出流路の上流端部に、送給流路の流路断面積よりも大きな溜部を設けることにあり、溜部３の長さＬの効果は、任意の長さで生じるものではなく、ある範囲で最大の効果を発揮する。すなわち、長さＬが短か過ぎるとペーストの均圧効果も発現できず、狭い領域でペーストの変形によるせん断速度が大きくなり、成形ひずみを残し易い。また機械加工時の返り防止の効果も発現しなくなる。逆に、長さＬが必要以上に長い口金は、排出流路間に形成されるピン状突起物の強度が低下し、口金の破損や変形を引き起こすことがある。これらのことを考慮した適切な長さＬ寸法は、（１）式で表される。

【００１６】

０．１＜　Ｌ／Ｄ　＜１　　……（１）

ここで、送給流路の直径　：Ｄ

溜部の長さ　　：Ｌ

（実施例）本実施例の効果を確認するため、図５～図７に示す構造で次の寸法形状の口金を試作した。

【００１７】

セルピッチ　　：３．３ｍｍ

リブ厚　　：０．４ｍｍ

送給流路の直径Ｄ：２．６ｍｍφ

送給流路の長さ　：１４．５ｍｍ

排出流路　　：５．０ｍｍ

口金厚さ　　：１９．０ｍｍ

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溜部の長さＬ　：０．５mm
セル数４７×４７セル（外形１５５．７mm×１５５．７mm）
供給流路はドリルと平行リーマとで、排出流路はＢＮ（ボロンナイトライド）砥石で加工した。得られた流路の内面粗さは次の通りである。
【００１８】送給流路の穴部　：３μm以下
排出流路の溝部　：０．２μm
この口金とスクリュー押出機とを用いて、Ｔｉ0_2系粉末／ガラス繊維／メチルセルロース／水をニーダにより混練し脱硝触媒ペーストにより成形した。その結果、成形圧力Ｐ＝４５～５０kg／cm²，流速Ｖ＝２００～２５０mm／minで曲がりのないセル相互の圧着も良好な成形体が得られた。また、この成形体を８５℃×７０％の条件下で乾燥し、割れのない健全な乾燥体が得ることができた。
【００１９】（比較例）実施例と比較するため、比較例として図８に示す構造で次の寸法形状の口金を試作した。
【００２０】
セルピッチ　：３．３mm
リブ厚　：０．４mm
送給流路の直径Ｄ：２．６mmφ
供給流路の長さ　：１４．０mm
排出流路　：５．０mm
口金厚さ　：１９．０mm
溜部の長さ　：０mm
セル数４７×４７セル（外形１５５．７mm×１５５．７mm）
供給流路はドリル（２００穴加工ごとに交換）加工のみ、排出流路はＢＮ砥石で加工した。得られた流路の内面粗さは次の通りである。
【００２１】
供給流路の穴部　：８～２０μm
排出流路の溝部　：０．２μm
この口金とスクリュー押出機とを用いて、実施例と同一組成，同一ロットのＴｉ0_2系脱硝触媒ペーストを成形した。その結果、成形圧力Ｐ＝５０～５５kg／cm²，流

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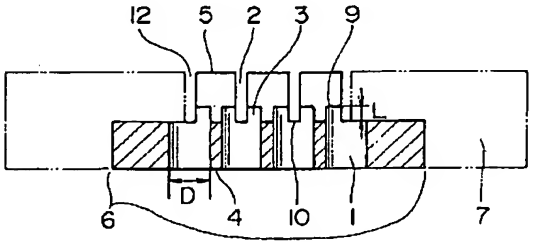
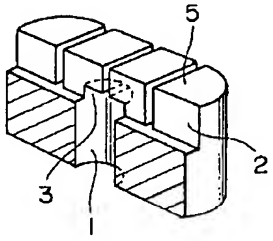
速Ｖ＝１５０～２００mm／minで実施例と比べて、圧力が高く流速が遅い。また成形体が一方向に曲がり、この曲がりは口金を回転させるとそれに応じて曲がりの方向も変わるところから、口金の形状に起因するものと断定できた。また、この成形体を８５℃×７０％の条件下で乾燥した結果、曲がりを拘束した時に引張りのひずみが生じた部分を起点に横割れが入った。
【００２２】これらの現象は、供給流路の表面が粗いことと、ペーストの送給流路の上流端部に溜部が存在しないことが原因と考えられる。
【００２３】
【発明の効果】本発明によれば、送給流路の上流端部にペーストの溜部を設けたため、機械加工性が優れるため寸法精度が向上し、かつ低圧で成形処理速度が大きくなり、ひずみの少ない均質な成形体を成形することができる効果がある。
【図面の簡単な説明】
【図１】本発明の一実施例を示す断面図である。
【図２】図１の斜視図である。
【図３】図１の単一流路を示す斜視図である。
【図４】本実施例と従来技術の流路断面積の比較を示す図である。
【図５】本発明の他の実施例を示す断面図である。
【図６】図５の斜視図である。
【図７】図５の単一流路を示す斜視図である。
【図８】従来の技術を示す断面図である。
【図９】図８のＡ．Ａ矢視線を示す平面図である。
【図１０】図８のＢ．Ｂ線矢視を示す平面図である。
【図１１】図８の斜視図である。
【図１２】図１の単一流路を示す斜視図である。
【図１３】従来の他の技術を示す斜視図である。
【符号の説明】
1　送給流路
2　排出流路
3　溜部
4　上流端
5　下流端
6　口金

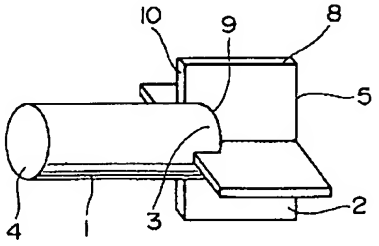
【図１】



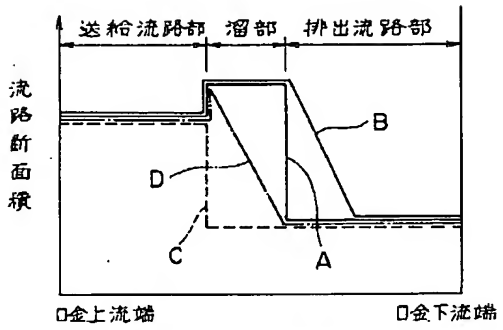
【図２】



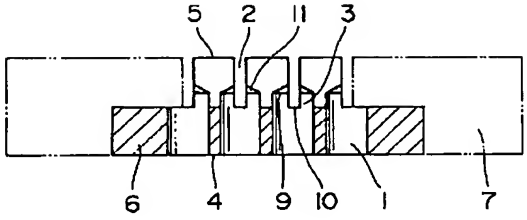
【図３】



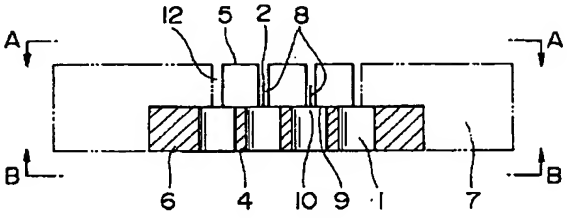
【図4】



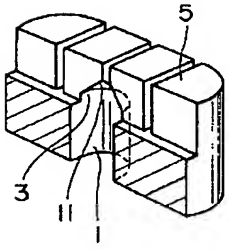
【図5】



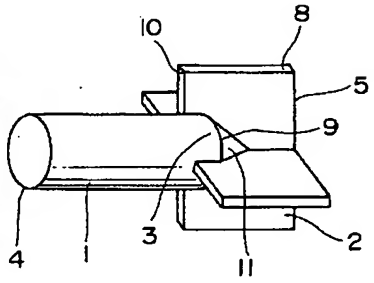
【図8】



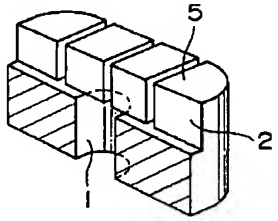
【図6】



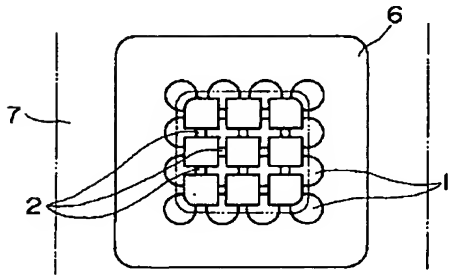
【図7】



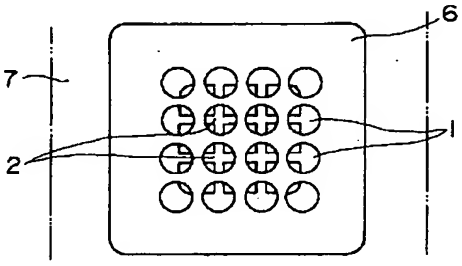
【図11】



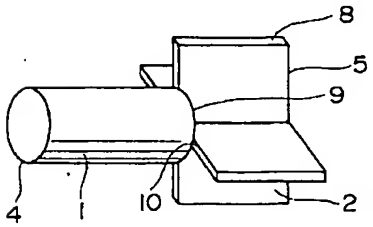
【図9】



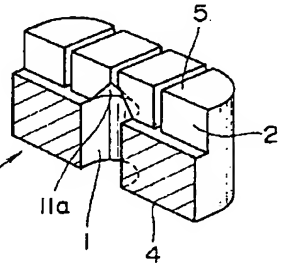
【図10】



【図12】



【図13】



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